Interaktion

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Editorial

Dear Member,

Newly released from M & M ELECTRONICS is a bulletin board software package specifically for the INTERAK computer. It is called INTERPLAY and comes complete with hardware details and full documentation. The program is individually customised to suit the needs of the end user. Contact M & M ELECTRONICS, 8 Ayre view, Bride, Isle of man for further details. It retails for £4.00p. M & M ELECTRONICS are also willing to start a bulletin board if sufficient people are interested.

When you draw diagrams I wonder if you would try to make my job a little easier. If you follow the guidelines below it will allow me to use your drawing direct, this gives accuracy, saves time and adds individuality to the newsletter.
Use A4 white paper with a 1.5 inch margin around all four sides.
Use a black pen or felt tip.
Put drawings on a seperate sheet from the text. In the text indicate where each drawing should be placed.

Bob

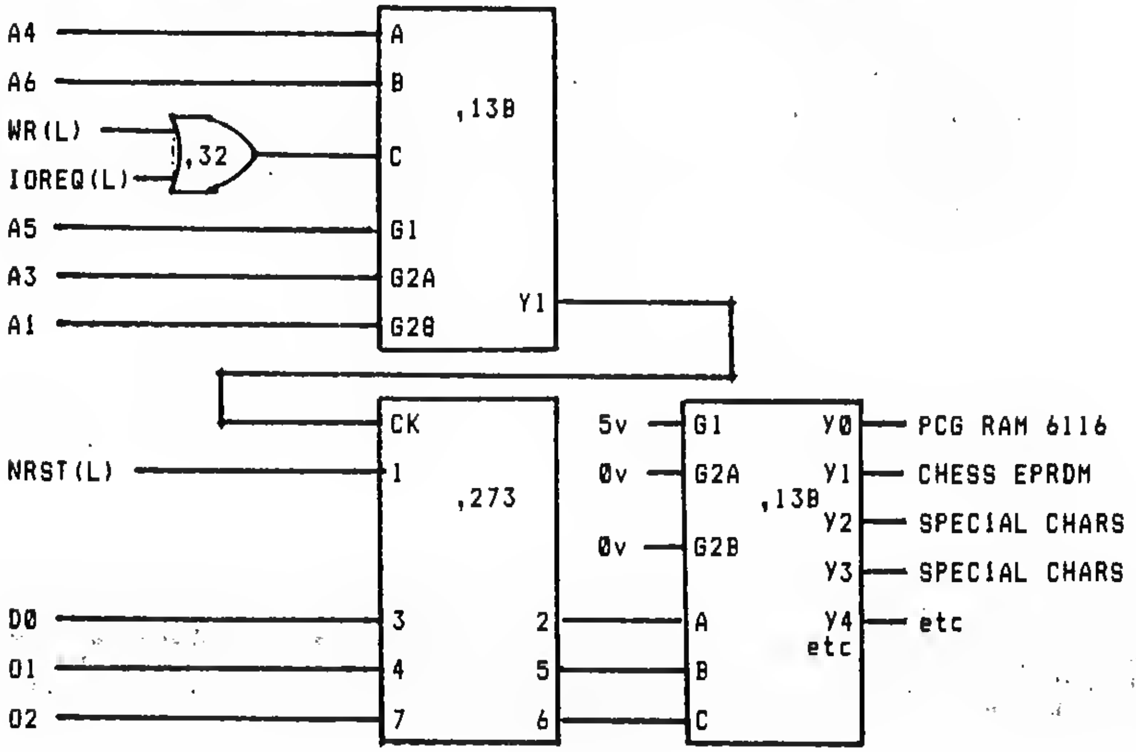
MODIFICATION TO THE PROGRAMMABLE CHARACTER GENERATOR
BY MEL SAUNDERS

Having built the PCG (programmable character generator) sometime ago, I have resently had a bit of a problem having obtained a copy of the Rakovsky chess program and EPROM.

The problem was when I needed the PCG the chess eprom was plugged into the VDU-K or the PCG was connected when I needed the chess EPROM. It was apparent that before to long sockets would ware and pins would bend, a shame really as there's lots of space on the PCG card.

What I did was to add a 74LS138 decoder addressed at 30H, this in turn latched the lower 3 data bits into a 74LS273, the 3 outputs then going to the A, B and C inputs of another 74LS138 (Tie enables high or low as nessasary). The select outputs are then used to select the PCG (Ram 6116), this is the default select '0', or the Eprom by OUT £30,01 or ZYMON P 30 01.

As there is still room on the PCG card for about 4 eproms it is possible to have many special sets of charaters to suit your needs.



FLAG CORRECTION SUB ROUTINE
BY JOHN.D.RITCHIE

This routine was written to correct an apparent anomaly in the Z80 flag register, as displayed by Zymon, when machine code programs are being written, de-bugged and run.

Books about the Z80 refer to the flag register as being an eight bit register of which six bits are used by the computer. That is bits 0,1,2,4,6 & 7. Bits 3 & 5 are rarely commented on.

Exceptionally, the author of the 'Z80 INSTRUCTION HANDBOOK' Nat Wadsworth, states on page 1-27 of that publication, that bits 3 & 5 are not used and are allways zero!. This excellent and highly recommended book was published in 1978 and therefore may at that time have been correct in this instance. However, two current issue Z80's from seperate manufacturers have indicated that not only can these flags be set, but that they often are. This can make deciphering Zymon's Hex presentation of the flag register confusing and difficult.

Hence this program, which effectively clears the offending flags as far as the programmer is concerned; but re-asserts the Z80's status-quo before exiting. The accompanying ready-reckoner makes the checking of flags a moments work.

FLAG CORRECTION SUB ROUTINE. version 2

```
AOOR  OP-COOE     MNEMONIC       REMARKS
0900  3A CE 0F    LD A,(0FCE)    LO A WITH GHOST FLAGS
0903  F5          PUSH AF        SAVE GHOST ANO CPU FLAGS
0904  E6 07       ANO 07         MASK OFF SPURIOUS FLAGS ANO ...
0906  32 CE 0F    LO (0FCE),A    .. PUT RESULT IN GHOST FLAGS REGISTER
0909  CD 82 05    CALL 0582      PRINT GHOST REGISTER SET
090C  F1          POP AF         RESTORE ORIGINAL CPU ANO ...
090D  32 CE 0F    LO (0FCE),A    .. GHOST FLAGS
0910  C9          RET            THEN RETURN
0911  E5          PUSH HL        SAVE HL
0912  21 00 09    LO HL,0009     LOAD HL WITH SUB AOORESS
0915  22 59 00    LD (0059),HL   MODIFY "PRINT REGISTERS CALL"
0918  22 07 01    LD (01D7),HL   AOORESS TO NEW VALUE, THEN ....
0918  E1          POP HL         ... RESTORE HL ANO ....
091C  FF          TERMINATOR     .. STOP
```

FLAG CORRECTION SUB ROUTINE TEST PROGRAM

Try this with and without correction sub-routine while using ready-reckoner. Note:- Step through the program stopping at the NOP'S and note the flags.

```
ADDR  OP-CODE     MNEMONIC       REMARKS
0800  3E 80       LD A,80
0802  ED 44       NEG            TWO'S COMPLEMENT ACCUMULATOR
0804  00          NOP
0805  3E 00       LD A,00
0807  EO 44       NEG            TWO'S COMPLIMENT ACCUMULATOR
0809  00          NOP
080A  2F          CPL ACC        COMPLIMENT ACCUMULATOR
0808  00          NOP
080C  3F          CCF            COMPLIMENT CARRY FLAG
0800  00          NOP
```

FLAG CORRECTION SUB ROUTINE - HOW IT WORKS.

The routine has two entry points, at 0058 and 0106 (These are the entry points for the 'Print ghost registers' sub routine, which is now called from the flag correction sub routine), and these have had 0900 inserted as the new call address.

The first action of the sub routine is to load the accumulator (A) with the contents of the ghost flag register (memory location 0FCE).

Next the ghost flags in (A) and the CPU flags in the flag register (F) are saved on the stack. The ghost register flags are still in the accumulator even though a copy is now on the stack; and can therefore be manipulated by 'anding' it with D7 hex. That is 11010111.

When this binary number is 'anded' with the contents of the accumulator, the bits of the accumulator are compared with the bits in the number.

If both are 'one' (1) then a 'one' is left in that location in the accumulator. If either bit is 'zero' (0) then a 'zero' is left in that location.

The result in this case is that regardless of the state of the flags, flags 3 and 5 are allways 'anded' with 'zero' and are therefore always 'zero' after this instruction. With the corrected result in the accumulator, the contents of the accumulator can now be copied into the ghost flag register at 0FCE.

The 'Print ghost registers' sub routine is now called, and displays the registers including the corrected flags.

On return from the sub routine execution continues at 090C with the restoration of the original CPU and ghost flags, which are popped off the stack.

The ghost flags then being loaded back into memory at 0FCE.

This last part is a belt and braces policy to ensure that the routine is entirely transparent to the operating system; so that if the CPU does use flags 3 and 5 they are restored, just before leaving the routine, to the same state they held on entry, in both the CPU and memory.

Once the routine has been entered at 0900, and the sub routine addresses altered at 0058 and 0196, Zymon can be used as normal, with the bonus that, with the aid of the ready-reckoner, you can now directly read the flag status.

FLAGS READY RECKONER

S=SIGN Z=ZERO H=HALF-CARRY PV=PARITY/OVERFLOW N=ADD/SUB C=CARRY

F	07	06	05	04	03	02	01	00
HEX	S	Z	X	^H	X	PV	^N	C
00								
01								**
02							**	
03							**	**
04						**		
05						**		**
06						**	**	
07						**	**	**
HEX	S	Z	X	^H	X	PV	^N	C
10				**				
11				**				**
12				**			**	
13				**			**	**
14				**		**		
15				**		**		**
16				**		**	**	
17				**		**	**	**
HEX	S	Z	X	^H	X	PV	^N	C
40		**						
41		**						**
42		**					**	
43		**					**	**
44		**				**		
45		**				**		**
46		**				**	**	
47		**				**	**	**
HEX	S	Z	X	^H	X	PV	^N	C
50		**		**				
51		**		**				**
52		**		**			**	
53		**		**			**	**
54		**		**		**		
55		**		**		**		**
56		**		**		**	**	
57		**		**		**	**	**

F	07	06	05	04	03	02	01	00
HEX	S	Z	X	^H	X	PV	^N	C
80	**							
81	**							**
82	**						**	
83	**						**	**
84	**					**		
85	**					**		**
86	**					**	**	
87	**					**	**	**
HEX	S	Z	X	^H	X	PV	^N	C
90	**			**				
91	**			**				**
92	**			**			**	
93	**			**			**	**
94	**			**		**		
95	**			**		**		**
96	**			**		**	**	
97	**			**		**	**	**
HEX	S	Z	X	^H	X	PV	^N	C
C0	**	**						
C1	**	**						**
C2	**	**					**	
C3	**	**					**	**
C4	**	**				**		
C5	**	**				**		**
C6	**	**				**	**	
C7	**	**				**	**	**
HEX	S	Z	X	^H	X	PV	^N	C
D0	**	**		**				
D1	**	**		**				**
D2	**	**		**			**	
D3	**	**		**			**	**
D4	**	**		**		**		
D5	**	**		**		**		**
D6	**	**		**		**	**	
D7	**	**		**		**	**	**

N.B FLAGS THAT ARE NOT ACCESIBLE TO THE PROGRAMMER "^"
X DENOTES FLAGS THAT ARE NOT USED BY THE CPU.
"SET" FLAGS FOR A GIVEN "F" ARE INDICATED BY "**"

RECORD LIBRARY PROGRAM
BY F.R.JOHNSON

FOR 64-COL XTAL BASIC

THIS PROGRAM IS THE WINNER OF THE GREENBANK SOFTWARE COMPETION.

This program although written specifically to catalogue my record collection is well REM'd and (hopefully), well structured, so that it might easily be modified for other file type programs such as stamp collections, names and addresses etc.

F.R.Johnson

```
 10 REM************************************************
 20 REM
 30 REM RECORD LIBRARY PROGRAM
 40 REM
 50 REM WRITTEN BY F.R.Johnson
 60 REM
 70 REM************************************************
 80 REM
 90 GOSUB 4740:REM Initialis & draw titles.
 100 FOR WHILE=0 TO 1:REM  Simulates
 110 GOSUB 170:REM         WHILE/WEND
 120 NEXT WHILE:REM        structure.
 130 END:REM Short program eh?
 140 REM
 150 REM************************************************
 160 REM
 170 REM MAIN MENU
 180 REM
 190 CLS
 200 IF NLPS=0 THEN L1=7:L2=10:L3=13:L9=16:Y=13:EXIT$="EXIT PROGRAM":
ADD$="ENTER INITIAL RECORD DATA":REM No data available.
 210 IF NLPS>0 THEN L1=3:L2=5:L3=7:L9=21:Y=3:
EXIT$="SAVE DATA AND/OR EXIT PROGRAM":ADD$="ADD RECORDS TO THE LIBRARY"
 220 PRINT @23,1,"LP RECORD LIBRARY"
 230 FOR U=46 TO 79:SET U,43:NEXT:REM Underlining.
 240 IF NLPS=0 THEN PRINT@21,3;"( No data available )":
PRINT@21,4;MUL$(CHR$(45),21)
 250 PRINT@5,L1;"LOAD DATA FROM CASSETTE";TAB(58,46);"1"
 260 PRINT@5,L2;ADD$;TAB(58)"2"
 270 PRINT@5,L3;EXIT$;TAB(58);"3"
 280 IF NLPS=0 THEN 350:REM No data - Reduce menu size.
 290 PRINT@5,9;"LIST ALL RECORDS BY AN ARTIST";TAB(58);"4"
 300 PRINT@5,11;"LIST ALL RECORDS IN A SECTION";TAB(58);"5"
 310 PRINT@5,13;"SEARCH FOR A RECORD TITLE & LIST ALL INFORMATION"
;TAB(58);"6
 320 PRINT@5,15;"LIST RECORDS (IN ANY ORDER)";TAB(58);"7"
 330 PRINT@5,17;"DELETE RECORDS FROM THE LIBRARY";TAB(58);"8"
 340 PRINT@5,19;"AMEND RECORD DATA";TAB(58);"9
 350 PRINT@5,L9;EC$;TAB(58);
 360 CALL &800:REM M/C Border.
 370 CHOICE=INCH
 380 IF CHOICE<&31 OR CHOICE>&39 THEN 370:REM 1st idiot trap.
 390 IF NLPS=0 AND CHOICE>&33 THEN 370:REM Reduced size menu.
 400 ON CHOICE-&30 GOSUB 4020,1840,4420,450,450,450,1000,3190,3500
 410 WHILE=STATUS:RETURN:REM Check 'WHILE/WEND' loop.
 420 REM
 430 REM************************************************
 440 REM
 450 REM SEARCH FOR RECORD(S) (Artist, section or title)
 460 REM
 470 SEARCH=CHOICE-&34:REM Convert CHOICE to 0,1 or 2.
 480 LP=0:REM Line count.
 490 FIRST=0:REM 1st record found flag.
 500 FOUND=0:REM Abortive search flag.
 510 CLS:PRINT@22,1;"SEARCH RECORD LIBRARY":PRINT:PRINT
 520 FOR U=44 TO 85:SET U,43:NEXT
 530 PRINT@20,4;"(Enter 'M' for main menu)":PRINT
 540 PRINT "Enter ";LEFT$(P$(SEARCH+1),15);
 550 INPUT" ";QUERY$
 560 IF QUERY$="M" THEN RETURN
 570 IF SEARCH=0 OR SEARCH=1 THEN PRINT:PRINT
"Hard copy ? (";Y$;"es or ";N$;"o)":IF INCH$="Y" THEN PRT=1:ELSE PRT=0
 580 QUERY$=LEFT$(QUERY$,10)
 590 REM CHECK 1st 10 characters only.
 600 IF PRT=1 THEN GOSUB 780:GOTO 720:REM Print routine.
 610 FOR S=1 TO NLPS
 620 IF QUERY$=LEFT$(LP$(S,SEARCH),10)THEN FOUND=S:
IF FIRST=0 THEN FIRST=1:HEAD=0:GOSUB 3870:REM Screen headings.
 630 IF FOUND=S THEN PRINT TAB(1,46);LP$(S,0);TAB(21);LP$(S,1);TAB(35);
LP$(S,2);TAB(58);S:LP=LP+1:GOSUB 710:REM Paging.
 640 IF SEARCH=2 AND FOUND=S THEN GOSUB 890:GOTO 650:
REM Only one record to find.
 650 NEXT S
 660 IF FOUND=0 THEN PRINT:PRINT LEFT$(P$(SEARCH+1),15);"not  found"
 670 PRINT:PRINT"Another search ? (";Y$;"es or ";N$;"o)";
 680 QUERY$=INCH$
 690 IF QUERY$="Y" THEN 480
 700 RETURN
 710 IF LP MOD 18=0 THEN PRINT:PRINT RL$:P=INCH:PRINT:REM Paging
 720 RETURN
 730 REM
 740 REM****************************************************
 750 REM
 760 REM PRINT ALL RECORDS BY ARTIST OR IN SECTION
 770 REM
 780 GOSUB 1600:REM Set up printer.
 790 FOR S=1 TO NLPS
 800 IF QUERY$=LEFT$(LP$(S,SEARCH),10)THEN PRINT TAB(10);LP$(S,0);
TAB(32);LP$(S,1);TAB(48);LP$(S,2);TAB(73);S
 810 NEXT S
 820 SPEED 255
 830 PRINT£0
 840 PRT=0
 850 RETURN
 860 REM
 870 REM*****************************************************
 880 REM
 890 REM DISPLAY ADDITIONAL INFORMATION
 900 REM
 910 PRINT@0,14;"ADDITIONAL INFORMATION"
 920 FOR U=0 TO 43:SET U,17:NEXT
 930 IF LP$(S,3)="" THEN PRINT:PRINT"None":GOTO 950
 940 PRINT:PRINT LP$(S,3)
 950 S=NLPS:REM Terminate loop.
 960 RETURN
 970 REM
 980 REM******************************************************
 990 REM
 1000 REM LIST RECORDS MENU
 1010 REM
 1020 CLS
 1030 PRINT@24,2,"LIBRARY LIST"
 1040 FOR U=48 TO 71:SET U,41:NEXT
 1050 PRINT@5,6;"CHECK AND/OR CHANGE ORDER OF LISTING";TAB(58);"1"
 1060 PRINT@5,9;"DISPLAY ON SCREEN";TAB(58);"2"
 1070 PRINT@5,12;"LIST TO PRINTER";TAB(58);"3"
 1080 PRINT@5,15;RM$;TAB(58);"4"
 1090 PRINT@5,18;EC$;TAB(58)
 1100 CALL &800:REM BORDER
 1110 CHOICE=INCH
 1120 IF CHOICE<&31 OR CHOICE>&34 THEN 990
 1130 ON CHOICE-&30 GOSUB 1190,1280,1480,1150
 1140 IF CHOICE=&31 THEN 1020:REM Stay with LIST menu.
 1150 RETURN
 1160 REM
 1170 REM****************************************************
 1180 REM
 1190 REM LIST ORDER
 1200 REM
 1210 IF ST=-1 THEN ST=0:REM Data loaded in artist order.
 1220 CLS:PRINT@4,4;"The data is sorted in ";ST$(ST);" order "
 1230 GOSUB 2670:REM Option to change order, but dont change ST.
 1240 RETURN
 1250 REM
 1260 REM****************************************************
 1270 REM
 1280 REM LIST TO SCREEN
 1290 REM
 1300 CLS
 1310 PRINT@24,1;"LIBRARY LIST"
 1320 FOR U=48 TO 71:SET U,43:NEXT
 1330 LP=0
 1340 PRINT@0,4;"There are ";NLPS;"records in the library,
press any key to list";
 1350 PAUSE=INCH
 1360 CLS
 1370 HEAO=1:GOSUB 3870:REM Change screen headings position.
 1380 FOR L=1 TO NLPS
 1390 PRINT TAB(1,46);LP$(L,0);TAB(21);LP$(L,1);TAB(35);LP$(L,2);
TAB(58);L
 1400 LP=LP+1:REM Page count.
 1410 IF LP MOD 18=0 THEN PRINT:PRINT RL$;" or 'M' for main menu":
PAUSE$=INCH$:CLS:HEAD=1:GOSUB 3870
 1420 IF PAUSE$="M" THEN L=NLPS:NEXT L:PAUSE$="":
RETURN                :REM Terminate loop and return to main menu.
 1430 NEXT L
 1440 PRINT:PRINT M$;
 1450 PAUSE=INCH
 1460 RETURN
 1470 REM
 1480 REM*****************************************
 1490 REM
 1500 REM LIST TO PRINTER
 1510 REM
 1520 CLS:LP=0
 1530 PRINT@14,10;"THERE ARE ";NLPS;"LP'S IN THE LIBRARY"
 1540 PRINT@14,12;"ENTER LP NO. TO START PRINTING FROM  ";
 1550 INPUT R1
 1560 IF R1<1 OR R1> NLPS THEN 1540
 1570 PRINT@14,14;"ENTER LAST LP NO. TO PRINT  ";
 1580 INPUT R2
 1590 IF R2<1 OR R2> NLPS THEN 1570
 1600 CLS
 1610 PRINT@0,10;"Ready printer - press any key"
 1620 PAUSE=INCH
 1630 PRINT@0,13;"Printing data    ..."
 1640 SPEEO 180:REM Slow printer!
 1650 PRINT£1:REM Output to printer.
 1660 PRINT TAB(10,32);"LP RECORD LIBRARY LIST"
 1670 PRINT:PRINT
 1680 IF PRT=1 AND SEARCH=0 THEN PRINT TAB(10);"
ALL RECORDS BY AN ARTIST":PRINT:PRINT
 1690 IF PRT=1 AND SEARCH=1 THEN PRINT TAB(10);"
ALL RECOROS IN A SECTION":PRINT:PRINT
 1700 PRINT TAB(10);"ARTISTS NAME";TAB(32);"
LP SECTION";TAB(48);"LP TITLE";TAB(73);"LP NO.":PRINT
 1710 IF PRT=1 THEN RETURN
 1720 FOR L=R1 TO R2
 1730 PRINT TAB(10);LP$(L,0);TAB(32);LP$(L,1);TAB(48);LP$(L,2);TAB(73);L
 1740 LP=LP+1
 1750 IF LP MOO 80=0 THEN PRINT:PRINT:PRINT:PRINT:REM Paging.
 1760 NEXT L
 1770 SPEEO 255
 1780 PRINT£0:REM Print to screen.
 1790 RETURN
 1800 REM
 1810 REM******************************************************
 1820 REM
 1830 REM
 1840 REM AOO OR AMENO RECOROS
 1850 REM
 1860 CLS
 1870 QUERY$="":REM Reset edit flag.
 1880 PRINT@21,2;"AOO/AMEND RECOROS":PRINT:PRINT
 1890 FOR U=42 TO 75:SET U,41:NEXT
 1900 IF AMO=0 ANO NLPS=MAXLPS THEN PRINT"Sorry, the library is full":
PRINT:PRINT M$;:PAUSE=INCH:RETURN
 1910 PRINT@10,4;"(Press CTRL+R to Return to main menu)"
 1920 FOR PN=1 TO 4             :REM  Print
 1930 PRINT@0,(PN+2)*2;P$(PN):REM  the
 1940 NEXT PN                   :REM  fields.
 1950 IF AMO=1 THEN GOSUB 2520:GOSUB 3780:GOTO 1980
 1960 REM In amend mode - print edit info & data in fields.
 1970 PRINT@0,16;"Enter the data and press
RETURN to move to the next field."
 1980 FOR ROW=6 TO 12 STEP 2         :REM  Cursor
 1990 FOR COLUMN=20 TO L(ROW/2-2)+20:REM  position
 2000 PRINT@ COLUMN,ROW;             :REM  routine.
 2010 D$=INCH$
 2020 IF D$=CHR$(18) THEN RETURN:REM CTRL+R
 2030 IF COLUMN=L(ROW/2-2)+20 THEN IF D$<>CHR$(13)
AND D$<>CHR$(8) AND D$<>CHR$(28) THEN 2010:REM Overflowing field.
 2040 IF D$=CHR$(13) THEN 2150:REM Down in enter data mode.
 2050 IF D$=CHR$(13) OR D$=CHR$(10) OR D$=CHR$(31) THEN 2150:
REM Down - using CR, CTRL+J or DOWN arrow.
 2060 IF D$=CHR$(11) OR D$=CHR$(30) THEN IF ROW>6 THEN ROW=ROW-2:
GOTO 2000:REM Up-using CTRL+K or UP arrow.
 2070 IF D$=CHR$(8) OR D$=CHR$(28) THEN IF COLUMN>20
THEN COLUMN=COLUMN-1:GOTO 2000:REM Left - using BS or LEFT arrow.
 2080 IF D$=CHR$(6) OR D$=CHR$(29) OR D$=CHR$(21)
THEN IF COLUMN< L(ROW/2-2)+19 THEN COLUMN=COLUMN+1:GOTO 2000:REM Right.
 2090 REM Right - using CTRL+F, RIGHT arrow or MY RIGHT arrow!
 2100 IF D$=CHR$(24) THEN GOSUB 2430:GOTO 2150:REM Remove junk.
 2110 IF D$="." THEN 2010:REM Dots not allowed in data.
 2120 IF D$<CHR$(32) THEN 2010
 2130 PRINT D$;
 2140 NEXT COLUMN
 2150 NEXT ROW
 2160 PRINT@0,14;"Is the above data correct (";Y$;"es or ";N$;"o)";
 2170 QUERY$=INCH$
 2180 PRINT@0,14;SPC(60)
 2190 IF QUERY$="N" THEN GOSUB 2520:GOTO 1980:REM Print edit
info' and re-position cursor for ammendment.
 2200 REM
 2210 REM**************************************************
 2220 REM
 2230 REM EXTRACT DATA FROM SCREEN
 2240 REM
 2250 FOR PN=1 TO 4                          :REM  Extract data
 2260 SN$(PN)=MID$(SCRN$((PN+2)*2),21,L(PN)):REM  from screen.
 2270 FOR LS=1 TO LEN(SN$(PN))
 2280 IF MID$(SN$(PN),LS,1)="." THEN DOT=LS:LS=LEN(SN$(PN)):
SN$(PN)=LEFT$(SN$(PN),DOT-1):REM Found 1st dot - remove them all.
 2290 NEXT LS
 2300 IF AMD=1 THEN LP$(RN,PN-1)=SN$(PN):ELSE LP$(NLPS+1,PN-1)=SN$(PN):
REM Enter data into main array.
 2310 NEXT PN
 2320 IF AMD=1 THEN RETURN:REM Amend mode.
 2330 NLPS=NLPS+1:REM Add 1 to total.
 2350 PRINT@0,14;"Any more to add? (";Y$;"es or ";N$;"o)";
 2360 QUERY$=INCH$
 2370 PRINT@0,14;SPC(60)
 2380 IF QUERY$<>"N" THEN 1840
 2390 GOSUB 2630:REM Sort array.
 2400 RETURN
 2410 REM
 2420 REM**************************************************
 2430 REM
 2440 REM REPLACE UNWANTED CHARACTERS WITH DOTS
 2450 REM
 2460 FOR DOT=COLUMN TO L(ROW/2-2)+19
 2470 PRINT@ DOT,ROW;".";
 2480 NEXT DOT
 2490 RETURN
 2500 REM
 2510 REM**************************************************
 2520 REM
 2530 REM EDIT INFORMATION
 2540 REM
 2550 PRINT@0,18;"To edit the data use the ARROW keys or the screen
editor codes"
 2560 PRINT"to position the cursor. Overwrite the data and press RETURN
to  enter the new data.";
 2570 PRINT" Press CTRL+X to erase unwanted characters   from the
cursor position to the end of the field."
 2580 PRINT"(Other screen editor commands, CTRL+B etc,are not allowed)."
 2590 RETURN
 2600 REM
 2610 REM**************************************************
 2620 REM
 2630 REM WHICH ORDER TO SORT
 2640 REM
 2650 CLS
 2660 ST=-1:REM Reset sort flag.
 2670 PRINT@4,6;"Do you wish to sort the data into:- ";A$;"rtist order?
 2680 PRINT@40,8;S$;"ection order?
 2690 PRINT@40,10;T$;"itle order?
 2700 PRINT@40,12;N$;"o change?
 2710 PRINT@4,14;"Press one of the highlighted keys   ";
 2720 PRINT@3,16;"(A change of order will take approximately ";
INT(NLPS/10)*10+10;"seconds)"
 2730 PRINT@40,14;
 2740 QUERY$=INCH$
 2750 IF QUERY$="A" THEN ST=0:REM   Set the sort
 2760 IF QUERY$="S" THEN ST=1:REM   flag for the
 2770 IF QUERY$="T" THEN ST=2:REM   SORT routine.
 2780 IF QUERY$="N" THEN RETURN:REM No sort required.
 2790 IF ST=-1 THEN 2740:REM Wrong key pressed.
 2800 REM
 2810 REM*****************************************************
 2820 REM
 2830 REM SORT ARRAYS (QUICKSORT)
 2840 REM
 2850 PRINT@3,18;"Sorting data into ";ST$(ST);" order........"
 2860 STACK(0,0)=0:STACK(0,1)=NLPS:SP=0
 2870 IF SP<0 THEN RETURN
 2880 P1=STACK(SP,0):P2=STACK(SP,1):SP=SP-1
 2890 FOR P=0 TO 3:PT$(P)=LP$(P1,P):NEXT P:OLDP1=P1:OLDP2=P2:P2=P2+1
 2900 P2=P2-1:IF P2=P1 THEN 2940
 2910 IF LP$(P2,ST)<PT$(ST) THEN GOSUB 3000:GOTO 2920:ELSE GOTO 2900
 2920 P1=P1+1:IF P1=P2 THEN 2940
 2930 IF LP$(P1,ST)>PT$(ST) THEN GOSUB 3090:GOTO 2900:ELSE GOTO 2920
 2940 FOR P=0 TO 3;LP$(P1,P)=PT$(P);NEXT P
 2950 IF OLDP1<P1-1 THEN STACK(SP+1,0)=OLDP1:STACK(SP+1,1)=P1-1:SP=SP+1
 2960 IF P2+1<OLDP2 THEN STACK(SP+1,0)=P2+1:STACK(SP+1,1)=OLDP2:SP=SP+1
 2970 GOTO 2870
 2980 REM
 2990 REM************************
 3000 REM
 3010 REM P1=P2
 3020 REM
 3030 FOR SW=0 TO 3
 3040 LP$(P1,SW)=LP$(P2,SW)
 3050 NEXT SW
 3060 RETURN
 3070 REM
 3080 REM************************
 3090 REM
 3100 REM P2=P1
 3110 REM
 3120 FOR SW=0 TO 3
 3130 LP$(P2,SW)=LP$(P1,SW)
 3140 NEXT SW
 3150 RETURN
 3160 REM
 3170 REM*****************************************************
 3180 REM
 3190 REM DELETE LP ENTRY
 3200 REM
 3210 IF NLPS=0 THEN CLS:PRINT@5,1;"No records in library - press
'M' for main menu":PAUSE=INCH:RETURN
 3220 CLS:PRINT@25,1;"DELETE ENTRY":PRINT:PRINT
 3230 FOR U=50 TO 72:SET U,43:NEXT
 3240 IF O1$="N" OR O2$="Y" THEN 3290:REM Jump over instructions
2nd time.
 3250 PRINT@0,4;"(When deleting a series of records start at the
highest number"
 3260 PRINT"as records are shifted back after deletion. Press any
key now)"
 3270 PAUSE=INCH
 3280 PRINT@0,4;SPC(128)
 3290 DLT=1:GOSUB 3550:REM Set DELETE flag & search file.
 3300 IF RN=0 THEN RETURN:REM Record not found.
 3305 HEAD=0:GOSUB 3870:REM Headings.
 3310 PRINT TAB(1,46);LP$(RN,0);TAB(21);LP$(RN,1);TAB(35);LP$(RN,2);
TAB(58);RN
 3320 PRINT:PRINT"Is this the correct record to delete? (";Y$;"es or
";N$;"o)";
 3330 O1$=INCH$
 3340 IF O1$<>"Y" THEN 3220
 3345 PRINT:PRINT:PRINT"Records being shifted - please wait"
 3350 FOR SH=RN+1 TO NLPS  :REM  Shift
 3360 LP$(SH-1,0)=LP$(SH,0):REM  records
 3370 LP$(SH-1,1)=LP$(SH,1):REM  back
 3380 LP$(SH-1,2)=LP$(SH,2):REM  one
 3390 NEXT SH                :REM  position.
 3400 NLPS=NLPS-1:REM 1 less.
 3410 PRINT:PRINT "Record deleted"
 3420 PRINT:PRINT"Any more to delete? (";Y$;"es or ";N$;"o)";
 3430 D2$=INCH$
 3440 IF D2$="Y" THEN 3210
 3450 DLT=0:D1$="":D2$="":REM Reset flags.
 3460 RETURN
 3470 REM
 3480 REM*************************************************
 3490 REM
 3500 REM AMEND RECORDS
 3510 REM
 3520 CLS
 3530 PRINT@24,2;"AMEND RECORD DATA"
 3540 FOR U=48 TO 81:SET U,41:NEXT
 3550 RN=0
 3560 PRINT@13,4;"(Enter 'M' to return to main menu)"
 3570 PRINT
 3580 INPUT"Enter record number.(Enter 'N' if number not known) ";RN$
 3590 IF RN$="N" THEN PRINT:PRINT"Press any key for the main menu &
use option 6 or 7 ";:PAUSE=INCH:RN$="M"
 3600 IF RN$="M" THEN RN=0:RETURN
 3610 IF VAL(RN$)<1 OR VAL(RN$)> NLPS THEN PRINT:PRINT"Record not
found, press a key";:PAUSE=INCH:RETURN
 3620 RN=VAL(RN$)
 3630 IF DLT=1 THEN RETURN:REM Return to DELETE routine.
 3640 AMD=1:REM Set amend flag.
 3650 CLS
 3660 GOSUB 1840:REM Add/Amend data routine.
 3670 PRINT@0,14;"Any more to amend? ( ";Y$;"es, ";N$"o or ";
S$;"ucceeding record )";
 3680 QUERY$=INCH$
 3690 PRINT@0,14;SPC(60):REM Clear line.
 3700 IF QUERY$="S" THEN RN=RN+1:RN$=STR$(RN):GOTO 3610:
REM Next record & check for last record.
 3710 IF QUERY$="Y" THEN 3500
 3720 GOSUB 2630:REM Sort array if required.
 3730 AMD=0
 3740 RETURN
 3750 REM
 3760 REM************************************************
 3770 REM
 3780 REM DISPLAY DATA IN FIELDS FOR AMENDMENT
 3790 REM
 3800 FOR PN=1 TO 4
 3810 PRINT@20,(PN+2)*2;LP$(RN,PN-1)
 3820 NEXT PN
 3830 RETURN
 3840 REM
 3850 REM************************************************
 3860 REM
 3870 REM RECORD HEADINGS
 3880 REM
 3890 IF PAUSE$="M" THEN RETURN
 3900 IF HEAD=1 THEN Y=1:V=43
 3910 IF HEAD=0 THEN Y=8:V=29
 3920 REM Change screen headings positions.
 3930 PRINT@0,Y;"ARTISTS NAME";TAB(21,32);"LP SECTION";TAB(35);
"LP TITLE";TAB(58);"LP NO.":PRINT
 3940 FOR U=0 TO 23:SET U,V:NEXT
 3950 FOR U=40 TO 59:SET U,V:NEXT
 3960 FOR U=68 TO 83:SET U,V:NEXT
 3970 FOR U=114 TO 124:SET U,V:NEXT
 3980 RETURN
 3990 REM
 4000 REM*************************************************
 4010 REM
 4020 REM LOAD DATA
 4030 REM
 4040 CLS
 4050 PRINT@4,8;"Are you sure that you have data to load?
(";Y$;"es or ";N$;"o)";
 4060 PRINT@6,10;"(If you have no data  press 'N' and use option 2"
 4070 PRINT@6,11;"from the main menu -'";ADD$;"')";
 4080 REM You can't 'ESC' if you have no data to load!
 4090 QUERY$=INCH$
 4100 IF QUERY$<>"Y" THEN RETURN
 4110 CLS:PRINT@5,10;"Press ";PY$;" on cassette and any key to load
data";
 4120 PAUSE=INCH
 4130 CLS:PRINT@0,10;"Reading in data.........."
 4140 PRINT:PRINT
 4150 DPEN FILE$,FD$
 4160 INPUT£ FD$;NLPS
 4170 IF NLPS=0 THEN 4220
 4180 FDR I=1 TD NLPS
 4190 FOR J=0 TD 3
 4200 INPUT LP$(I,J)
 4210 NEXT J,I
 4220 CLOSE
 4230 RETURN
 4240 REM
 4250 REM*****************************************************
 4260 REM
 4270 REM SAVE DATA TD TAPE
 4280 REM
 4290 CLS:PRINT@0,10;"Press ";PY$;" and ";RD$;" on cassette and any key
to save data";
 4300 PAUSE=INCH
 4310 PRINT:PRINT
 4320 CREATE FILE$,FD$
 4330 PRINT£FD$;NLPS
 4340 IF NLPS=0 THEN 4390
 4350 FOR I=1 TD NLPS
 4360 FOR J=0 TO 3
 4370 PRINT LP$(I,J)
 4380 NEXT J,I
 4390 CLDSE
 4400 RETURN
 4410 REM
 4420 REM*****************************************************
 4430 REM
 4440 REM LEAVE PRDGRAM MENU
 4450 REM
 4460 IF NLPS=0 THEN GOSUB 4670:RETURN:REM No data-exit program
 4470 CLS
 4480 PRINT@20,2;"SAVE DATA AND/OR EXIT"
 4490 FDR U=40 TD 82:SET U,41:NEXT
 4500 PRINT@5,6;"SAVE DATA & RESUME PRDGRAM";TAB(58);"1"
 4510 PRINT@5,9;"SAVE DATA & EXIT PRDGRAM";TAB(58);"2"
 4520 PRINT@5,12;"EXIT PRDGRAM NOW";TAB(58);"3"
 4530 PRINT@5,15;RM$;TAB(58);"4"
 4540 PRINT@5,18;EC$;TAB(58)
 4550 CALL &800:REM Border.
 4560 CHDICE=INCH
 4570 IF CHDICE<&31 DR CHOICE>&34 THEN 4560
 4580 DN CHDICE-&30 GDSUB 4630,4630,4670,4590
 4590 RETURN
 4600 REM
 4610 REM**************************
 4620 REM
 4630 REM SAVE & RESUME/EXIT
 4640 REM
 4650 GOSUB 4270:REM Save data.
 4660 IF CHDICE=&31 THEN RETURN:REM Resume.
 4670 SEP 44:REM Restore separator.
 4680 CLS
 4690 STATUS=1:REM Set 'WHILE/WEND' flag for exit.
 4700 RETURN
 4710 REM
 4720 REM*****************************************************
 4730 REM
 4740 REM INITIALISATIDN
 4750 REM
 4760 MAXLPS=300:DIM LP$(MAXLPS,3):REM Main array,
 4770 DIM STACK(20,1),PT$(3):REM Sort arrays.
 4780 DIM ST$(2):ST$(0)="Artist":ST$(1)="Section":ST$(2)="Title"
 4790 STATUS=0:REM 'WHILE/WEND' flag - 0 to repeat - 1 to exit.
 4800 NLPS=0:REM No.of records - (0 until data loaded).
 4810 SEP 59:REM Changes SEParator to ; (, may be used in data)
 4820 FILE$="RECORDS.DAT":REM File name.
 4830 M$="(Press 'M' for main menu)"
 4840 EC$="Enter choice"
 4850 RM$="Return to main menu"
 4860 RL$="Press RETURN for more listing"
 4870 Y$=CHR$(217):N$=CHR$(206):S$=CHR$(211):A$=CHR$(193):T$=CHR$(212)
 4880 PY$=CHR$(208)+CHR$(204)+CHR$(193)+CHR$(217)
 4890 RO$=CHR$(210)+CHR$(197)+CHR$(195)+CHR$(207)+CHR$(210)+CHR$(196):
REM Reverse video characters.
 4900 IOM 5,0:REM Turn off leading spaces (LP No.).
 4910 DIM P$(4)
 4920 P$(1)="Artist's name     > ................... <"
 4930 P$(2)="Record section    > ............. <"
 4940 P$(3)="Record  title     > ....................... <"
 4950 P$(4)="Other information > ........................................
 4960 DIM L(4)
 4970 L(1)=19:L(2)=13:L(3)=23:L(4)=40:REM Data string lengths.
 4980 DIM SN$(4):REM Screen data strings.
 4990 IF PEEK(&800)=&21 THEN 5070:REM M/C data already POKE'd
 5000 FOR R=&800 TO &825:READ Z$:Z$="&"+Z$:POKE R,VAL(Z$):NEXT
 5020 REM M/C data for border.
 5030 DATA 21;0;F0;11;C0;F5;3E;28;6;20;77;12;23;23;13;13;10;F8;21;40;
F0;11;7E;F0;6;16;E;40;77;12;23;13;D;20;F8;10;F5;C9
 5040 REM
 5050 REM*****************************************************
 5060 REM
 5070 REM DRAW TITLES
 5080 REM
 5090 CLS
 5100 FOR X=6 TO 116 STEP 2:FOR Y=5 TO 3 STEP-1:SET X,Y:NEXT Y,X
 5105 REM
 5120 FOR X=6 TO 12 STEP 2:FOR Y=41 TO 9 STEP-1:SET X,Y:FOR T=1 TO 2:
NEXT T,Y,X
 5130 FOR X=14 TO 30 STEP 2:FOR Y=41 TO 39 STEP-1:SET X,Y:NEXT Y,X
 5140 FOR X=14 TO 30 STEP 2:FOR Y=38 TO 9 STEP-1:SET X,Y:RESET X,Y+3:
NEXT Y,X
 5160 REM
 5170 FOR X=40 TO 46 STEP 2:FOR Y=41 TO 39 STEP-1:SET X,Y:NEXT Y,X
 5180 FOR X=40 TO 46 STEP 2:FOR Y=38 TO 9 STEP-1:SET X,Y:RESET X,Y+3:
NEXT Y,X
 5220 REM
 5230 FOR X=58 TO 64 STEP 2:FOR Y=41 TO 9 STEP-1:SET X,Y:FOR T=1 TO 2:
NEXT T,Y,X
 5240 FOR X=66 TO 74 STEP 2:FOR Y=41 TO 39 STEP-1:SET X,Y:FOR T=1 TO 4:
NEXT T,Y,X
 5250 FOR X=66 TO 74 STEP 2:FOR Y=38 TO 25 STEP-1:SET X,Y
 5260 IF Y<36 THEN RESET X,Y+3
 5270 NEXT Y,X
 5280 REM
 5290 FOR X=76 TO 82 STEP 2:FOR Y=41 TO 25 STEP-1:SET X,Y:FOR T=1 TO 4:
NEXT T,Y,X
 5300 FOR X=84 TO 90 STEP 2:FOR Y=41 TO 39 STEP-1:SET X,Y:NEXT Y,X
 5310 FOR X=84 TO 90 STEP 2:FOR Y=38 TO 9 STEP-1:SET X,Y:RESET X,Y+3:
NEXT Y,X
 5360 REM
 5370 FOR X=95 TO 97 STEP 2:FOR Y=41 TO 39 STEP-1:SET X,Y:NEXT Y,X
 5380 FOR X=95 TO 97 STEP 2:FOR Y=38 TO 23 STEP-1:SET X,Y:RESET X,Y+3:
NEXT Y,X
 5430 REM
 5440 X=104:SET X,41:FOR Y=41 TO 9 STEP-1:SET X,Y:IF Y>20 THEN
RESET X,Y+1
 5450 NEXT Y
 5460 FOR Y=14 TO 10 STEP-1:RESET X,Y:NEXT Y
 5470 FOR X=106 TO 112 STEP 2:SET X,41:FOR Y=41 TO 9 STEP-1:SET X,Y:
IF Y>20 THEN RESET X,Y+1
 5480 NEXT Y
 5490 FOR Y=20 TO 16 STEP-1:RESET X,Y:NEXT Y
 5500 FOR Y=14 TO 10 STEP-1:RESET X,Y:NEXT Y
 5510 NEXT X
 5520 X=114:SET X,41:FOR Y=41 TO 9 STEP-1:SET X,Y
 5530 IF Y>14 THEN RESET X,Y+1
 5540 IF Y<20 THEN SET X,21
 5550 NEXT Y
 5555 REM
 5560 FOR T=1 TO 3000:NEXT
 5570 RETURN
 5590 REM********************************************************
```

8255 PROGRAMMABLE PERIFERAL INTERFACE
BY STEVE PADLEY

A few months ago whilst on the phone to Dave Parkins I brought up the subject of the use of programmable ports. To my surprise (and no disrespect intended), he seemed very unenthusiastic about them, in fact quite anti.

This is a great shame really, after having produced a very versatile computer with great potential and then turn away from a very versatile porting system. One of the objections raised was the mere fact that you had to program it. Well this is neither difficult, lengthy or time consuming and is in fact the key to its versatility.
EG. In Basic a simple instruction such as OUT 15,12B has programmed the B255 so ports A, B & C are all basic output ports. (More about that later).

To the home experimenter like myself the B255 is a very useful tool because it is so versatile. It can give you basic input or output ports, a bidirectional port with full 'handshake' facility and ports A and B as input or output with handshake. On the end of it you can stick whatever circuit your experimenting with at the time.

The 8255 is a general purpose I/O port device providing 24 I/O lines divided as shown :-

PORT A	PORT C (upper)	PORT C (lower)	PORT B
2 bits	4 bits	4 bits	B bits

There are three modes of operation (selected by a control word) :-

Mode 0 Corresponding to simple I/O, that is any of the 3 ports can be configured as input or output.

Mode 1 Ports A and B can be configured as input or output, Port C upper carries the control signals for Port A 'handshaking', Port C lower carries control signals for Port B.

Mode 2 Configures Port A as a bidirectional I/O port with two way 'handshaking' via Port C.

The various modes are selected by placing a 'Control Word' into the control register (accessed via the address bus or port location).

EG. On my board the Control port sits at 0FH (15 decimal).
Port A 0CH (12).
Port B 0DH (13).
Port C 0EH (14).

Interpretation of the control word register is as follows :-

```
| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
    !      \-------v-----/     !       !       !       !       !
Mode set flag      !       Port A      !   Port B      !   Port C
 1 = Active        !       Function    !   Mode        !   (lower)
                   !       1 = Input   !   0 = Mode 0  !   Function
                   !       0 = Output  !   1 = Mode 1  !   1 = Input
                   !                   !               !   0 = Output
            Determines            Port C          Port B
            Port A mode:-         (upper)         Function
            00 = Mode 0           Function        1 = Input
            01 = Mode 1           1 = Input       0 = Output
            1X = Mode 2           0 = Output
```

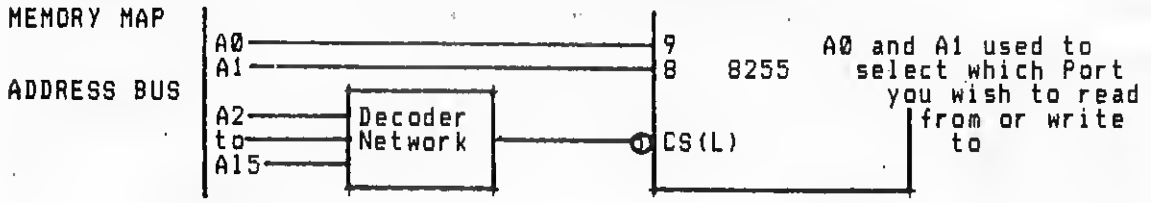
So taking the earlier example of OUT 15,12B is sending the value 12B to the control register situated at 0FH in the port map.

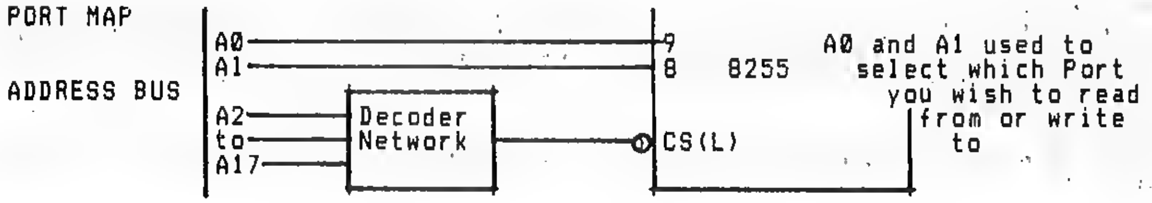
```
In Hex 12B is B0H :-      1   0  0  0  0  0  0  0
                        12B  64 32 16  B  4  2  1
```

Look at the B bit word , compare it to the control word definition and you will see that the 8255 is now programmed in mode 0 Ports A, B and C all outputs. Simple isn't it, you can output data to any of the three ports.

There are two ways of bringing the 8255 into the computer system.

1. Memory Mapping :- Using all of the address bus.
2. Port Mapping :- Using A0 to A7 of the address bus.

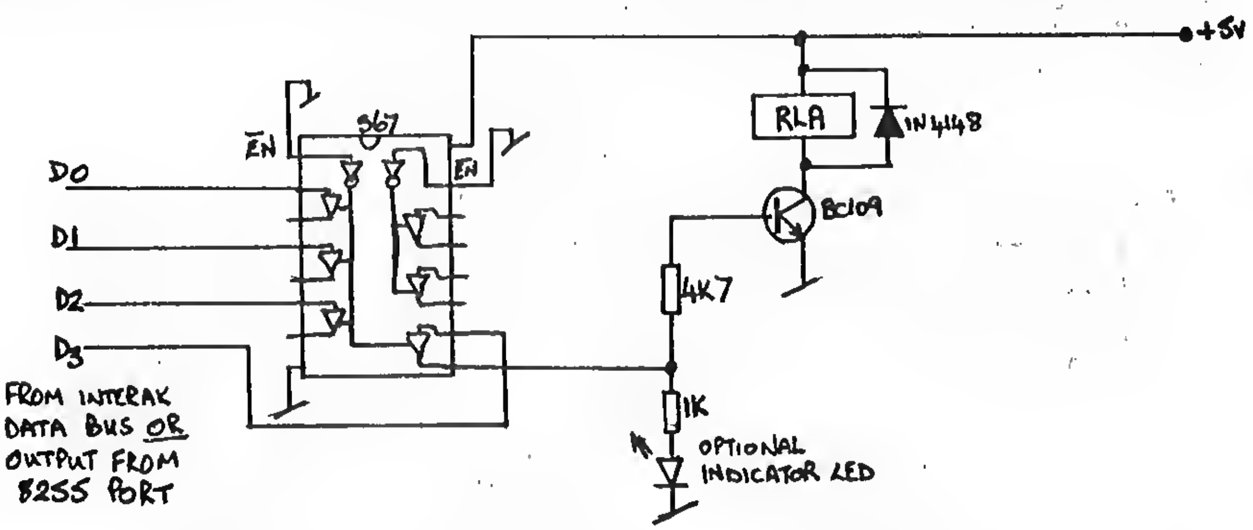

MEMORY MAP
ADDRESS BUS
A0
A1
A2
to
A15
Decoder Network
9
8
8255
CS(L)
A0 and A1 used to select which Port you wish to read from or write to


PORT MAP
ADDRESS BUS
A0
A1
A2
to
A17
Decoder Network
9
8
8255
CS(L)
A0 and A1 used to select which Port you wish to read from or write to

Once the Programmable port chip is in operation it allows you the freedom to play with various periferals without having to design into the circuit a complete address decoding system. This is not only cost effective but also allows you more time and space on developing the meat of your circuit.

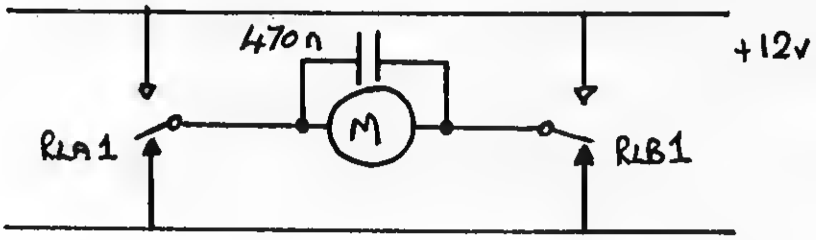
So far l have used the 8255 with piezo electric buzzers, sound generators, motor control through relay circuits, 7 segment displays, micro switches, reed switches and so on. Light detectors and heat detectors are next on the list along with A to D and D to A converters. Even if you don't like fiddling around with hardware there's nothing to stop you using it for a parallel printer ......

The 8255 chip is a very handy chip for the home experimenter and to get you started here is a circuit that can be used with it. Below is a relay controller diagram using a 74LS367 and a couple of BC109 transistors. My intention is to use it as a motor controller for a "Turtle" but it does have other possible applications, eg. Switching on/off mains powered equipment.



For simplicity just one relay circuit is shown, but a possibility of six relays is evedent, by looking at the chip. The relays used are 5v types with 1A 250v AC contact rating. (Obtained in Tandy stores). All the other stuff is out of the proverbial bit box. The 74LS367 pins 1 and 15 are taken to 0v to permanently enable it, however if you wish to make this into a complete port in its own right then an address decoding cct will have to be added, (something like that employed by lnterak), to provide EN(L) pulse when a relay is to be energised, but note, the 367 is not a latched device so when it is disabled all relays will de-energise.

My board is constructed with 4 relays on a piece of veroboard 80mm x 100mm, a nice size to mount on a small motorised unit to be computer controlled via an umbilical. Two relays will control one OC motor as shown in the circuit below. Oepending on which relay is energised the direction of rotation is decided. Add to this a second OC motor with two more relays and you have control for Forward, Reverse, Left, Right and of course Stop, on a motorised buggy.



Anyone wishing for more info on this device, I have the data sheet for it, or if anyone wants to build this port I have a design for the Interak prototyping board.

One other point to consider as adantageous is cost. The chip itself can be bought for £4.95p and for that modest sum you have a multifunction Port system just waiting for simple instructions.

A light sensor board is now being experimented with, so watch this space. Also if anyone is currently working on the same lines as myself I would be happy to hear from them.

STEVE PAOLEY, 14 WICKHAM ROAO, FAREHAM, HANTS, PO16 7EU.

CHEMIST
BY MEL SAUNOERS
FOR 64-COL XTAL BASIC

```
 10 T=9:CLS
 20 CLS:S=0:L=1
 40 PRINT@19,1,"********CHEMIST********":PRINT
 50 PRINT   "YOU ARE A CHEMIST OF SORTS YOU COULO OISCOVER SOMETHING'
GREAT'   OR BLOW YOURSELF UP! YOUR THAT SORT OF CHEMIST!!"
 53 PRINT@1,6," BUT BEFORE YOU IS YOUR LATEST SECRET?"
 55 IOM4,1:IOM5,1
 60 PRINT@1,8," 2 FORMULAS YOU MUST MIX THEM TOGETHER IN THE RATIO OF
3parts    OF FORMULA'A' TO 7parts OF..... FORMULA'B'"
 70 PRINT@1,11," YOUR COMPUTER WILL MEASURE OUT A QANTITY OF FORMULA'A'
ANO...   ASK YOU TO AOO A QANTITY OF...  FORMULA'B'"
 75 FORT=TTO0 STEP-1:IF T=0 THEN 310
 78 PRINT@0,17,"
                                                                   "
 79 PRINT@27,22,"              "
 80 PRINT@1,15,"              then waite and see! you have"T"lives left "
 85 REM:CALCALATE FORMULA RATIO
 90 A=INT(RNO(25)+1):W=7*A/3
 100 PRINT@2,20,"HERE IS";A;"CC OF FORMULA'A'":PRINT
 110 PRINT@2,22,:INPUT"HOW MUCH FORMULA'B'TO AOO ";R
 120 O=ABS(W-R)
 125 REM:CALCALATE OIFFERANCE
 130 IF O>W/20 THEN 300
 140 S=S+1:X=S
 150 FMT0,2
 160 IF D=0 THEN 200
 170 IF O>0 ANO O<=.6 THEN 220
 180 IF O>.6 ANO D<=1.2 THEN 240
 190 IF O>1.2 THEN 260
 200 PRINT@2,17,"THAT WAS A VERY GOOO BIT OF MATHS OEAO ON THE OOT!"
 210 FORQ=1TO2500:NEXTQ:GOTO280
 220 PRINT@2,17,"A GOOO CACULATION OF W=A*7/3...BUT YOU WERE"O"CC OUT"
 230 FORQ=1TO2500:NEXTQ:GOTO 280
 240 FMT1,2:PRINT@2,17,"AN AVERAGE GUESS! I SUPPOSE BUT BE VERY CAREFUL
YOU COULO LOSE   YOUR LIFE "O"CC OFF!!"
```

```
 250 FDRQ=1TD2500:NEXTQ:GDTD280
 260 FMT1,2:PRINT@2,17,"YDU ARE GETTING VERY SLDPPY DUT BY"D"CC,DD YDU
WANT TD DIE"
 270 FDRQ=1TD2500:NEXT:GDTD2B0
 2B0 FMT0,0:NEXTT
 290 GDTD 310
 300 PRINT@2,17,"SDRRY YDU 8LDW IT YDU HAVE LDST"L"LIVES":L=L+1:
FDRQ=1TD2500:NEXTQ:GDTD 2B0
 310 CLS:PRINT@1,13,"YDU HAVE RAN DUT DF LIVES! YDU LDST"L",
AND SAVED"S"LIVES!":IF L>S THEN 330
 320 IF L<S THEN 350
 330 PRINT@1,16,"as you lost too many lives this computer is calling
an END to   this experiment before you! kill us both"
 340 END
 350 PRINT@2,16,"not a bad attempt you saved...   over half your lives      "
 360 PRINT@10,18," DPTIDN-risk them again (Y/N)";:SWAPX,T
 370 F=INCH:IF F=B9 GDTD 20:IF F<>B9 THEN END
 375 REM
 3B0 REM ********************
 390 REM * CDPYRIGHT        *
 400 REM * MEL SAUNDERS 4/B4*
 410 REM ********************
```

SPACE INVADERS V2
BY SIMDN WALLER
SPECIAL SDUND EFFECTS
BY MEL SAUNDERS

For a 64 character VDU-2K. This excellent arcade style program has been enhanced with sound effects for the various hits and bangs that create the realism factor. Please advise the newsletter of your highest score.

Execute by typing E 1000
< key moves the laser gun left
> key moves the laser gun right
Space bar to fire the laser

If you baulk at typing this lot in, contact Mel Saunders for a tape of the code. He will advise the cost of this service over the phone. See contacts page for his address or ring him on 0533-544774. He can also advise on the sound card and can provide programs to develop your own sounds.

```
1000   CD 29 16 3E 02 32 79 16 AF 32 B1 16 32 B2 16 32
1010   B7 16 21 9E 16 11 30 F0 01 0A 00 ED B0 21 40 F0
1020   22 BB 16 21 C4 16 11 23 F0 01 07 00 ED B0 2A BB
1030   16 31 00 20 11 40 00 19 22 BB 16 22 7A 16 11 BF
1040   01 19 22 7C 16 3A 87 16 3C 32 B7 16 3A 79 16 3C
1050   FE 08 28 03 32 79 16 21 29 F0 34 3E 39 BE 30 04
1060   36 30 28 34 CD 4B 15 0E 04 3E 1C 11 B0 00 2A 7A
1070   16 06 0F 77 23 36 20 23 10 F9 19 0B 3E C0 A5 6F
10B0   08 0D 20 ED 11 10 00 21 C6 F4 3E 03 0E 03 23 06
1090   05 36 0F 23 10 F8 19 0D 20 F5 3D 20 EF 3E 1D 32
10A0   67 16 3E FF 32 6B 16 21 C4 F5 22 69 16 36 3E 2B
10B0   36 28 28 36 3C 21 00 00 22 B3 16 21 6B 16 06 0B
10C0   36 00 23 10 FB 21 50 90 22 73 16 06 14 21 8A 16
10D0   36 00 23 10 FB 3A B1 16 3C FE 08 2B 06 32 B1 16
10E0   32 77 16 AF 32 76 16 32 7B 16 32 B5 16 CD 04 11
10F0   CD 99 13 CD F3 14 3A 7B 16 CB 27 ED 44 C6 C0 32
1100   74 16 1B E9 F5 C5 D5 E5 DD 21 73 16 DD 4E 01 DD
1110   46 00 CD 4B 11 10 F8 DD E5 C5 CD FB 13 CD FB 13
1120   CD EF 11 C1 DD E1 0D 20 E6 3A 67 16 57 3E 39 92
1130   32 67 16 2A 7A 16 01 00 02 ED B1 E2 43 11 2B 72
1140   23 1B F6 E1 D1 C1 F1 C9 CD 0E 16 C8 FE 03 CA 08
1150   16 FE 20 28 2E E6 2F FE 2C 28 1A FE 2E C0 2A 69
1160   16 23 3E FE BD CB 22 69 16 36 3E 2B 36 2B 2B 36
1170   3C 2B 36 20 C9 2A 69 16 2B 3E C3 BD CB 23 36 20
11B0   2B 1B E3 21 6B 16 C5 0E 00 06 04 7E 23 B6 23 2B
1190   01 0C 10 F7 21 B6 16 79 C1 8E C8 3C 32 85 16 3A
11A0   B2 16 3C 32 82 16 FD 21 6B 16 FD 7E 00 FD 23 FD
11B0   B6 00 FD 23 20 F4 2A 69 16 28 11 40 00 B7 ED 52
11C0   FD 75 FE FD 74 FF 7E FE 1C 2B 04 FE 1D 20 1D 3A
11D0   7B 16 3C 32 7B 16 CD 0A 15 3A 78 16 FE 3C CA 27
11E0   15 36 20 FD 36 FF 00 FD 36 FE 00 C9 36 5E C9 C5
11F0   3E 07 A1 C1 C0 3A B5 16 B7 CA B8 12 C5 06 04 FD
1200   21 6B 16 FD 6E 00 FD 66 01 7C B5 FD 23 FD 23 CA
1210   83 12 7E 36 20 FE 20 2B 4A FE 5E 2B 46 FE 1C 2B
```

```
1220   2E FE 1D 28 2A FE 24 20 78 DD 21 8A 16 DD 7E 00
1230   8D 20 16 DD 7E 01 8C 20 10 AF DD 77 00 DD 77 01
1240   3A 76 16 3D 32 76 16 18 58 DD 23 DD 23 18 DE CD
1250   50 17 3C 32 78 16 CD 0A 15 3A 78 16 FE 3C CA 27
1260   15 18 41 11 40 00 87 ED 52 FD 75 FE FD 74 FF 7C
1270   D6 F0 20 05 3E 40 95 30 28 7E 36 5E FE 20 28 33
1280   36 20 FE 1E 28 04 FE 1F 20 93 CD E0 17 23 23 36
1290   20 21 00 00 22 83 16 AF 32 82 16 C5 06 0A CD 0A
12A0   15 10 F8 C1 FD 36 FF 00 FD 36 FE 00 3A 85 16 3D
1280   32 85 16 05 C2 03 12 C1 C5 3E 1F A1 C1 C2 70 13
12C0   C5 06 0A DD 21 8A 16 11 40 00 DD 66 01 DD 6E 00
12D0   7C 85 CA 67 13 7E FE 5E 28 52 FE 24 20 02 36 20
12E0   19 19 7C ED 52 FE F6 20 36 7E FE 20 28 20 CD 80
12F0   17 3D 32 79 16 CA F2 15 21 FD EF 11 05 00 19 3D
1300   20 FC C5 06 05 36 20 23 10 F8 C1 CD 5F 15 DD 36
1310   01 00 DD 36 00 00 3A 76 16 3D 32 76 16 18 48 7E
1320   FE 5E 28 08 FE 0F 20 33 36 20 18 E2 DD 36 00 00
1330   DD 36 01 00 36 20 FD 21 68 16 FD 7E 00 FD 23 FD
1340   23 8D 20 F6 FD 7E FF 8C 20 F0 FD 36 FE 00 FD 36
1350   FF 00 3A 76 16 3D 32 76 16 18 0C DD 74 01 DD 75
1360   00 FE 20 20 02 36 24 DD 23 DD 23 05 C2 CA 12 C1
1370   2A 83 16 7C 85 C8 3E 3F A1 C0 36 20 23 22 83 16
1380   36 1E 23 36 1F 3E 7F BD C0 36 20 28 36 20 CD 00
1390   18 22 83 16 AF 32 82 16 C9 F5 C5 D5 E5 3A 68 16
13A0   A7 28 2D 3E FF 32 68 16 3E 20 21 7F F0 11 40 00
1380   06 16 8E 20 18 19 10 FA 2A 7C 16 28 ED 58 7C 16
13C0   01 00 02 CD 87 14 18 28 CD 58 14 18 D6 CD 58 14
13D0   3E 00 32 68 16 3E 20 21 40 F0 11 40 00 06 16 8E
13E0   20 E6 19 10 FA 2A 7A 16 23 ED 58 7A 16 01 00 02
13F0   CD 89 14 E1 D1 C1 F1 C9 F5 C5 D5 E5 DD E5 DD 21
1400   67 16 DD 7E 0F DD 8E 10 28 4A 3C DD 77 0F 3A 78
1410   16 ED 44 C6 3C 47 04 ED 5F DD 86 0E 88 38 04 90
1420   3C 18 F9 32 75 16 5F DD 56 00 3E 39 92 2A 7A 16
1430   01 00 02 ED 81 E2 2D 14 1D 20 F8 28 DD 21 8A 16
1440   DD 5E 00 DD 23 DD 7E 00 DD 23 83 20 F3 E8 DD 73
1450   FE DD 72 FF DD E1 E1 D1 C1 F1 C9 21 40 00 ED 58
1460   7C 16 19 22 7C 16 E8 3E FF 32 7E 16 01 00 02 CD
1470   87 14 2A 7A 16 11 40 00 19 22 7A 16 2A 7F 16 11
1480   C0 F5 A7 ED 52 D2 F2 15 C9 FD 21 00 00 7E FE 1C
1490   28 04 FE 1D 20 05 12 36 20 FD 23 23 13 08 78 81
14A0   20 EB FD E5 C1 21 78 16 7E ED 44 C6 3C 91 C8 47
1480   CD 0A 15 34 10 FA C9 FD 21 00 00 7E FE 1C 28 04
14C0   FE 1D 20 13 12 36 20 FD 23 3A 7E 16 87 28 08 AF
14D0   32 7E 16 ED 53 7F 16 28 18 08 78 81 20 DD FD E5
14E0   C1 21 78 16 7E ED 44 C6 3C 91 C8 47 CD 0A 15 34
14F0   10 FA C9 3A 82 16 FE 1E D8 AF 32 82 16 2A 83 16
1500   7C 85 C0 CD AC 17 22 83 16 C9 E5 D5 C5 F5 3A 87
1510   16 47 21 39 F0 3E 3A 34 8E 20 05 36 30 28 18 F7
1520   10 F0 F1 C1 D1 E1 C9 CD 40 18 11 C0 F5 01 17 00
1530   ED 80 CD 0E 16 C8 AF FE 4D 20 F7 21 40 F0 11 41
1540   F0 01 C0 05 36 20 ED 80 C3 2E 10 3A 79 16 3D C8
1550   11 02 F0 21 8F 16 01 05 00 ED 80 3D 20 F5 C9 F5
1560   C5 D5 E5 06 0A 21 8A 16 5E 36 00 23 56 36 00 23
1570   7A B3 28 08 1A FE 24 20 03 3E 20 12 10 EA 2A 69
1580   16 36 19 28 36 2A 28 36 19 11 40 00 A7 ED 52 3E
1590   20 8E 20 02 36 5C 23 8E 20 02 36 18 23 8E 20 02
15A0   36 2F 0E 04 06 00 CD 1C 16 0D 20 F8 3E 01 32 76
1580   16 2A 69 16 36 3E 28 36 28 28 36 3C 11 40 00 A7
15C0   ED 52 7E FE 5C 20 02 36 20 23 7E FE 18 20 02 36
15D0   20 23 7E FE 2F 20 02 36 20 E1 D1 C1 F1 C9 C5 D5
15E0   E5 21 00 F0 11 01 F0 01 00 06 36 20 ED 80 E1 D1
15F0   C1 C9 21 0E 17 11 C0 F5 01 0F 00 ED 80 CD 0E 16
1600   C8 AF FE 59 CA 00 10 FE 4E 20 F2 C3 00 E0 16 00
1610   D8 40 C6 80 30 03 57 18 F7 7A 87 C9 11 01 00 21
1620   90 00 ED 52 30 FC 10 F7 C9 CD DE 15 21 CB 16 11
1630   88 F2 01 18 00 ED 80 21 E6 16 11 88 F3 01 21 00
1640   ED B0 CD 0E 16 28 F8 D6 31 38 F7 3C FE 04 30 F2
1650   32 86 16 21 07 17 11 70 F5 01 07 00 ED B0 CD 0E
1660   16 28 F8 CD DE 15 C9 1C 00 EA F5 E9 F1 29 F1 69
1670   F3 00 00 50 4A 01 01 01 3C 03 C0 F1 7F F3 00 FF
1680   F1 01 08 52 F0 03 03 01 80 F0 2E F4 00 00 00 00
1690   00 00 00 00 00 00 00 00 00 00 00 00 00 00 53 63
16A0   6F 72 65 20 30 30 30 30 50 72 65 73 73 20 4D 20
1680   66 6F 72 20 6E 65 78 74 20 77 61 76 65 20 20 20
16C0   3C 28 3E 20 57 61 76 65 20 30 30 53 20 50 20 41
16D0   20 43 20 45 20 20 20 49 20 4E 20 56 20 41 20 44
16E0   20 45 20 52 20 53 45 6E 74 65 72 20 73 68 69 6C
```

```
16F0  6C 20 6C 65 76 65 6C 20 31 2C 32 2C 33 20 20 28
I700  31 3D 68 61 72 64 29 52 65 61 64 79 20 3F 50 6C
1710  6I 79 20 6I 67 61 69 6E 20 3F 20 20 20 00 00 00
I720  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
I730  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
1740  00 15 06 05 07 C0 08 10 09 I0 0A 10 0C 03 0D 04
1750  D9 21 40 17 06 I0 0E C0 ED A3 0E CI ED A3 20 F6
I760  D9 3A 78 16 C9 FF FF FF FF FF FF FF FF FF FF FF
1770  06 1A 07 C0 08 10 09 I0 0A I0 08 FF 0C FF 0D 00
1780  D9 21 70 17 06 I0 0E C0 ED A3 0E C1 ED A3 20 F6
I790  D9 3A 79 I6 C9 FF FF FF FF FF FF FF FF FF FF FF
I7A0  00 20 07 FE 08 I0 0C 05 0D 0A 00 00 D9 2I A0 17
1780  06 0A 0E C2 ED A3 0E C3 ED A3 20 F6 D9 2I 40 F0
I7C0  C9 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
I7D0  0I 05 06 IA 07 C0 08 I0 09 10 0A I0 0C 40 0D 00
17E0  D9 21 D0 I7 06 10 0E C2 ED A3 0E C3 ED A3 20 F6
17F0  D9 28 36 20 C9 FF 00 00 00 00 00 00 00 00 00 00
I800  01 00 06 00 07 00 08 00 09 00 0A 00 0C 00 0D 00
I8I0  D9 21 00 I8 06 I0 0E C2 ED A3 0E C3 ED A3 20 F6
I820  D9 2I 00 00 C9 FF 00 00 00 00 00 00 00 00 00 00
I830  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
1840  0I 00 06 00 07 00 08 00 09 00 0A 00 0C 00 0D 00
1850  D9 21 40 I8 06 10 0E C2 ED A3 0E C3 ED A3 20 F6
I860  D9 2I A8 16 C9 FF 00 00 00 00 00 00 00 00 00 00
I870
```

HANGMAN
8Y PETE VELLA
ZY8ASIC 32 CDL SCREEN

```
I REM ****************************
2 REM *HANG MAN(ENGLISH VERSIDN)*
3 REM *       8Y P.VELLA        *
4 REM ****************************
7 DDFF:PAGE:FDR S=ITD40:@(S)=0:N.S
9 CLS:G=0
I0 GDS.310
15 GDS.330
20 GDS.350
25 GDS.370
30 GDS.390
35 GDS.410
40 GDS.430
45 L1NE6:P.TA8(9)"P1ay  Hang  Man"
50 FDRW=ITD2500:N.W
60 CLS:L1NE12:P.TA8(14)"He11o"
65 LINEI4:P.TA8(7)"What is your name?"
70 N$=IN.
75 GDS.500
77 FDR Q=ITDLEN(8$):@(40+Q)=0:N.Q
80 CLS:E=0:K=0:G=G+1
8I IFG=40G.9
82 IF LEN(N$)>20G.90
84 T=INT((32-(I1+LEN(N$)))/2)
85 LINE4:P.TA8(T)N$,"the word is"
90 GDS. 550
95 LINE8:P.TA8(7)"Choose  a  Ietter"
97 LINE2I:P." (Press contro1 c to end game)
I00 INK. L:IF L=0G.I00
I0I IFL=3 G.200
I02 L=L+£20
I03 D=0
I05 FDR S=1TD LEN(8$)
II0 IFL=PEEK(£8IFF+S):G.I40
1I5 N.S
117 IF O=0 E=E+1:GDS.305
1I8 IFE=7G.I96
I20 G.I00
I40 D=I:POKE H+S,L
I42 @(40+S)=1
I43 Q=0
I44 FDR L1=1TDLEN(8$):IF@(40+LI)=0Q=1
145 N.LI
I47 IFQ=0G. I90
150 N.S
155 G.I00
190 FDR F=1TD5:LINE2I:P.TA8(I5)" "
```

```
192 FOR W=ITO500:N.W
I93 LINE2I:P.TAB(I0)"That's good"
I94 FOR W=1TO500:N.W
I95 N.F:G.75
I96 FOR F=1TO5:LINE2I:P." ":FOR W=1TO500:N.W
I97 LINE2I:P.TAB(INT((32-LEN(B$))/2))B$:FORW=1TO500:NEXTW:NEXTF
I98 G.75
200 SCROLL:LINEI:DON:CLS.:S.
300 REM HANG MAN
305 ONE GOS.3I0,330,350,370,390,410,430
310 FOR X=25TO40:SET(X,10)
320 N.X:R.
330 FOR Y=I0TO30:SET(25,Y)
340 N.Y:R.
350 FOR X=25TO37:SET(X,30)
360 N.X:R.
370 POKE£FI32,24:POKE£FI52,24
380 R.
390 POKE£F172,£4F
400 R.
410 POKE£FI92,26:POKE£FI9I,25
420 POKE£FI93,25:R.
430 POKE£F1B1,£2F:POKE£FIB3,£5C
440 R.
500 REM FETCH WORD
510 P=RND(40):IF@(P)=IG.5I0
515 @(P)=I
520 RESTORE
525 FOR PI=ITOP:READ B$:N.PI
530 R.
550 REM DRAW DOTS
560 FOR Z=ITO LEN(B$)
565 H= £F0AE-INT((LEN(B$)/2))
566 POKEH+Z,£20:N.Z
570 R.
I000 DATA "walk","black","fish","loop","move","house","door","stone","lane",
"brief","phase","knew","object","young"
I0I0 DATA "recent","lively","sugar","depot","court","lady","guide","happy",
"special","chef","health","table","battery","entry","pupils","mayor","among"
1020 DATA "paper","people","year","area","contact","punk","concert","play",
"game"
```

LETTERS

Please write with comments, ideas, complaints and suggestions. Name and address must be enclosed, but can be with-held. Responsibility for views and comments expressed cannot be held by the editor as members letters are published with the minimum changes (deleted bad language etc). (Note; I type what I see, if you forget a word then it will be missing in the newsletter, also if you spell a word wrong then it's quite likely that I will punch it in wrong.)

Dear Ed,

Not long ago I completed the VDU-2K modifications, with due regard to David Parkins commentary which was helpfull. Imagine my consternation when I got I2 lines of 64 characters followed by I2 lines of garbage. You of course, would have concluded that a number of alterations to ZYMON 2 were needed. It took me lomger to catch on though: First I had to go through a lot of carefull checking that the hardware was not at fault, and after that a deal of rather slow cerebration.

So my first complaint is: I do think you might have drawn attention to the software aspect of the modification.

My second complaint is : Having got Zymon to work I used it to load ZYBASIC and that gives the same symptoms! Two program lines per screen line over the top half of the screen and anything that Zymon has left over the other half. Well, in the Zymon case I had the listing and could work it out. But in the ZYBASIC case not so, since the excellent manual does not go so far as to list the program.

So my plea: Please advise with all reasonable haste what has to be done to make ZYBASIC produce a sensible 64x24 display. Surely the question has come up before this?

A.G.BOGLE, 22 BRIGHTON RD, PARNELL, AUCKLAND, NEW ZEALAND.
(ED - Both ZYMON and ZYBASIC owners can get converted software from Greenbank

Electronics. They only charge the postage, packaging and copying costs. All new software is written for both formats, but very soon now only the 64 by 24 format will be needed, as the new VDU card becomes available.)

Dear Ed,

Thank you for publishing my letter in IUGN-8. Since writing the letter however, the information I gave in the letter is now incorrect. My address has changed, and the Unicom Modem now looks suspiciously like a DEMON modem, it's cost is more, and it's not BABT approved!

Please would you include my new address in the next issue of IUGN to avoid any mail going astray. Finally would you ask anyone interested in instigating a modem group for the INTERAK to write a letter to me, explaining what they would want from such a group, if they have anything to contribute to the hardware or software also it would be helpfull if they would enclose a stamped self addressed envelope so that I can reply.

If we manage to get a group sorted out I will keep the IUGN up-to-date with developments.
STEVE BRUMBY, 28 HARTINGTON TERRACE, BRADFORD, WEST YORKSHIRE, BD7 2HW.

Dear ED,

With reference the VDU-2K mod, everything is now OK. I had lost my way on the non-socket side of the board, and made an incorrect connection. The mod works fine, thanks, and Greenbank will be updating Zymon 2 for me.

Is there anyone out there with an interest in digital synthesis of organ and synthesiser music?. I have recently traded in my old electronic organ, and find the new one possesses, amongst other things, a pair of sockets labled MIDI IN and MIDI OUT. This I understand means Music Interchange for Digital Instruments and apart from plugging in a synthesiser or something it sounds as if it would link to a computer!. (I wonder what music looks like). So far I have not been able to track down any information, except that it does exist.

I also have a part built, part working, Analog Synthisiser, that I will now want to re-build but this time by using digital techniques, so, if there's anyone with similar interest who would like to communicate, I should be most gratefull. My system is Interak 1 with 64k memory, Bob's modified VDU-2K, a paralled port cum printer port, and soon to be added, a serial port, (currently at the ideas stage). Anyone who can direct my heading in the MIDI direction would ensure my eternal gratitude.

Another future project would be a Gold or Prestel link up, and while on the subject does anyone think the club might benifit by becoming a subscriber and thus provide a data base, notice board, what have you, and provide another useful job for our hard working systems to do. I guess for this to be a success there would need to be some agreed standard. Perhaps the experts will be able to guide us.
ROY HARRISON, 102 HESTON ROAD, HESTON, MIDDLESEX, TW5 0QP.

(Ed. David Parkins of Greenbank has asked me to include the next letter sent to him as he feels Chris deserves the right of reply to his earlier comments.)
Dear David,

A few more words on the addition of an opto-isolator to the LKP-1. As you may recall I modified my board to allow the use of a long unscreened keyboard cable. It enables even self scanning keyboards to be used without spurious pulses being introduced onto the strobe line from adjacent data lines.

Might I add a few notes in reply to your discussion of the circuit.

(A) The positive supply to the 'diode' part of the opto-isolator is applied at the keyboard end. Since the strobe signal into the LKP-1 is now on a balanced pair induced signals from the data lines are effectivley cancelled out.

(B) A 1k resistor results in a diode current of around 4ma so avoiding excess current in a CMOS driver. Although the RS-307-979 has a quoted current transfer ratio of 20% minimum I have found typical values of 100% or so. In fact the quoted maximum is 300% the resultant strobe signal has therefore been less than 0.8v for a logic 0. In a production situation it would be wise to use the darlington version to garantee a 300% transfer ratio.

(C) As you advise, it is good practice to aim for a fast rise time. Fortunatly in the case of the 74LS273 we can dispense with this requirement as the clock input is level sensitive and the set up time is not critical.

It goes without saying that, like other Interak boards the LKP-1 is ideal for

this sort of experimentation, especially when tailor-made systems are required to an unusual specification!
CHRIS DAVIS, 35 LAVEROCK AVENUE, HAMILTON, LANARKSHIRE, ML3 700.

Dear ED,
May I express my thanks to Greenbank for donating the SIO-4 board which I have won. I have many ideas for using this board but the one I am most interested in is to use it in conjunction with a modem to talk to other Interak owners.

I work in the datacomm field (it gets wet sometimes) and am most fortunate to be very interested in communications generally so therefore I feel a certain responsibility in starting the ball rolling.

The most important point though is that the more playing this game the merrier (unless you've got your own supply of scotch) so anything that I suggest is exactly that. A suggestion.

To get to the point then I think that the 300 baud (that how fast they go. i.e. not very) modems are the easiest and cheapest to obtain.

Software :- We would have to write our own. There are probably commercial programs availible but they would have to be altered and I would like anyone with an Interak-1 (+SIO-4 + modem) to be able to join in. The above two things i.e. modem and software would have to be the same for everyone otherwise the computers just would not talk to each other.

The most important thing to consider though is what do we hope to achieve at the end of it all. What do you interakers want? Would you like to exchange programs over the phone? Would you like to leave messages for someone?

One thought that I had is for a database e.g. programs, ideas, messages (sounds like a newsletter) to be on one Interak which everyone would ring instead of everyone ringing each other. This though presents more practical problems than meets the eye. Who would the unlucky person be who cannot play on his Interak cos everyone else wants to access it? Who would be the unlucky person whose phone would be jammed with fellow Interakers. The software would need to be far more sophisticated. If you think I'm painting a black picture you are right. But don't be depressed I'm just pointing out problems which although can be easily overcome need to be thought out. It's like I said earlier if we all go the same way with hardware and software then it will be much more fun.

I'm eager to see what every one else thinks and very open to suggestions (so my wife tells me) I'm also very keen to put in some work in on this, so if anyone else is interested let me know. Some of you out there may be already talking to each other and not letting me in on it. If you are, please get in touch before my bottom lip hits the floor.

Also I am a dungeons and dragons player (briefly; a character role playing game where running a sword through a dragons eyeball is allowed- if you can run fast enough that is) is there any D+D interakers out there? Anyway I must go now as it is well past my bedtime so my thanks again to greenbank and I hope to hear from someone soon.

DAVE GORDON, 40 KIRKSTONE ROAD, WEST LITHERLAND, MERSEYSIDE, L21 0EQ.

Dear Ed,

The Finger on the pulse

Well! thats what I feel like sometimes being in contact with quite a number of members, mostly by P.C. Tapes. I often hear what members are doing or hoping to do with there Interaks.

Resently I heard a few moans and groans mostly regarding the lack of software in Interaktion, and thin copies (20 pages) some even said not worth the subscription??

I perhaps wrongly tackled David about this and some very very interesting facts came to light!

Only about 50% of members have ever paid any subs. 376 x subs of £7.00p (approx) = £2600.00p sounds a lot but is more like £1295.00p in real terms. As far as value for money go's cost for issue No 8 are PRINTING £937.00p and POSTAGE ETC £79.80p... with a grand total of approx £6500.00p to date. So for those who ask where do all the subs go?........ not far enough!!

Interaktion seems a very democratic paper, Pete and Bob have said in the past they will do whatever the majority want!!

Lets put it to the vote what do we want?

Software well I think some of you out there should give it a try and send your own programs in, you could win a prize, at the minute there's more prizes than competitors (well just about).

Hardware well I'm working on a real time clock using a MC146818 or a MM58274 (not 58174) anyone seen a MM58274 advertized for sale!, I would also like to see proper PCB's produced for the PSG and PCG designs. But you can build these on the DIP card like I did! if you want sound and programable characters?

We have such a range of users in our group, CP/M users, starters, machine code wiz kids, and perhaps a few robots or buggies out there! Some of us may never get around to CP/M or disk (PETE - what about XTL disk version). Modems are of limited interest to me mainly as we have no phone, but it don't stop me from reading how they work.

I did want to get a DATA BANK going ie. a collection of all data sheets on all kinds of chips we could use on Interak, so if you can send me photocopies of any you have it could be usefull to others, I have a lot on Ferranti A-D/D-A, also Nat-Semi's.

I would be very thankfull for any help anyone can give me with the Eprom programmer, I have got this working OK, but have lots of TMS2532 4K Eproms and need pin and programming details, or I would swap for 2716 2K...

Lastly drop me a line, say what you think!

MEL SAUNDERS, 7 DRUMCLIFF ROAD, THURNBY LODGE, LEICESTER, LE5 2LH.

Dear Sir,

Exponentation

I have always had reservations about the program given on page 14 of UGN-2, because it is some distance from being exact when the value of X is small. Eg. it gives EXP(0.00234) as 0.994418 instead of the correct value of 1.00234.

I attach a listing which takes up a bit more memory space but has the advantage of being much more nearly exact. It has the limitation of not accepting X values above 88, but that does not, to me, seem serious, since EXP(88) is 1.6516 x 10^38. Anyway the other program has the same limitation.

By analogy perhaps we should include: 515 IF X > 88 P."OVERFLOW":S.

If included in a program it would of course be entered at line 515 and exited with a line 630 E = X3: RET.

My natural logerithm routine, also by summation of a series, gives also a pretty precise evaluation, as does that on the same page of UGN-2. However, the latter has the limitation of not accepting inputs above 524000, whereas mine accepts up to 10^38, for whatever use that may be! On your spaceship, perhaps! I can send it later if you in your wisdom, (Ed: gulp), think it of interest.

```
500 REM SUBROUTINE TO CALCULATE EXP(X)
510 IN. "ENTER OPERAND X" X: X5=X
520 X9=0: X8=0: IF X=0 X3=1: G.620
530 IF X<0 X=-X: X8=1
540 IF X>1 X=X/2: X9=X9+1: G.540
550 IF X=1 X3=2.718282: G.610
560 REM X NOW IS BETWEEN 0 AND 1
570 X3=1+X: X4=X: X1=8: X2=2
580 X4=X4*X/X2: X3=X3+X4
590 X2=X2+1: X1=X1-1: IF X1>0 G.580
600 IF X9=0 G.620
610 X3=X3*X3: X9=X9-1: IF X9>0 G.610
620 IF X8=1 X3=1/X3
630 P."EXP(",X5,")=",X3: RET.
```

A.G.BOGLE, 22 BRIGHTON ROAD, AUCKLAND 1, NEW ZEALAND.

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6502 Games	Rodney Zaks

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See Contacts page at the end of this issue for "BOOKS" address.

Richard Bowyer

SOFTWARE

See CONTACTS page at the end of this issue for "ORDER FROM" addresses.

Software supplied is the responsibility of the "ORDER FROM". Please deal directly with the "ORDER FROM" in the event of bugs ect.

You may use this section to sell software to other users. Send a brief description of your product giving details of its distribution and price, to the EDITOR.

Note that you will be responsible for the support of your own product. The newsletter cannot be held responsible for or get involved with duff code or distributers.

Of course we will publish letters deriding any product that fails to live up to its claims.

MACHINE CODE

NAME	DESCRIPTION	VDU	ORDER FROM	COST
ASM 64	EDITOR ASSEMBLER	C	USER GROUP	£ 5.00
FIGFORTH	FORTH COMPILER	A,C	USER GROUP	£15.00
HC DISASS	SIMPLE DISASSEMBLER	A	USER GROUP	£ 3.00
INTERPLAY	BULLETIN BOARD DRIVER	C	M&M ELECTRONICS	£ 4.00
MEGABUG	DEBUG/TRAINING PACKAGE	C	USER GROUP	£13.00
RAKOVSKY	COMPUTER CHESS (6 LEVS)	C	USER GROUP	£ 5.00
REVAS	BETTER DISASSEMBLER	A	USER GROUP	POA
VELTEXT	TEXT EDITOR	A,C	USER GROUP	£ 5.00
XTAL BASIC	14K BASIC	A,C	USER GROUP	£40.00
ZYBASIC 2A	INTERAK BASIC (TAPE)	A	GREENBANK	£15.95
ZYBASIC 2C	INTERAK BASIC (ROM)	A	GREENBANK	£27.75
ZYBASIC 3A	INTERAK BASIC (TAPE)	C	GREENBANK	£15.95
ZYBASIC 3C	INTERAK BASIC (ROM)	C	GREENBANK	£27.75
ZYMON 2.V003	INTERAK MONITOR	A	GREENBANK	£15.95
ZYMON 2.V203	INTERAK MONITOR	C	GREENBANK	£15.95

ZYBASIC BASIC

NAME	DESCRIPTION	VDU	ORDER FROM	COST
AVALANCHE	GAME	A	USER GROUP	PP
COUNT	LEARN TO COUNT	A	USER GROUP	PP
DICE PONTOON	GAME	A	USER GROUP	PP
GRAPH	GRAPH PLOTTER	A	USER GROUP	PP
HAPPY SUMS	FUN MATHS	A	USER GROUP	PP
HANGMAN	SPELLING GAME	A	USER GROUP	PP
MONSTER MASH	GAME	A	USER GROUP	PP
NOUGHTS & CROSSES	GAME	A	USER GROUP	PP
POOLS PICK	RANDOM DRAW SELECTOR	A	USER GROUP	PP

XTAL BASIC

NAME	DESCRIPTION	VDU	ORDER FROM	COST
AWARI	GAME	C	M.SAUNDERS	PP
BIORYTHMS		C	M.SAUNDERS	PP
CHAR DES	CHARACTER DESIGNER	C	M.SAUNDERS	£ 5.50
CRAZY MAZE	GAME	C	USER GROUP	PP
I-SPY	GAME	C	M.SAUNDERS	PP
LANDER	GAME	C	USER GROUP	PP
SOUND DEV	SOUND DEVELOPMENT	C	M.SAUNDERS	£ 5.50
TOWERS	GAME	C	USER GROUP	PP

Key:
A = 32x24 VDU-K,
C = 64x24 VDU-2K,
PP = Postage & packing. Send no money, you will be billed.
POA = Please enquire (Phone for price.)

ASM64
Z80 assembler, Runs at 1000H. Printer output at ports 6 and 7, tape at ports 4 and 5. Uses the Mostek standard assembly language syntax. Supports the additional operators END,DS,DW,DB,EQU,ORG and LOAD. Full line editor with dynamic line renumbering. Programs may by assembled to memory to run at a different location. Manual included with package.
USER GROUP, £5.00p, Machine code, Needs Zymon.

INTERPLAY
Bulletin board software package. The program tests for the physical top of memory and allocates all unused memory above 1A90H as a buffer for incoming text. It also tests for the VDU-xK screen width and adjusts itself accordingly. There are two versions on the distributed tape, one for the standard SI04 serial card using ports 2 & 3, the other using the Zymon cassette port allocation and the DTI card hardware. The DTI card must be modified to allow operation and drawings showing the detail are distributed with the program. There are no major changes to the card, two IC's added in the patch area with some discrete components, all connections to the existing DTI card being made via the existing pin assemblies. Supplied with, Cassette tape, Manual, Quick reference card, Constructional notes for DTI MM1&2, Parts list for DTI MM1&2.
M & M ELECTRONICS, £4.00p, Machine code, tape, Needs Zymon.

MEGABUG
Megabug is an interactive machine code debugging tool, allowing single step progress through a program whilst observing the Z80 register set at each instruction. It can debug Rom or Ram held code. A program being run under Megabug can be interupted by pressing the space bar to get a register display followed by single stepping to let you find the problem or examine the actions of the computer. Runs on the standard Interak with a VDU-2K screen, occupies Ram B000H-BBE2H. Screen active programs can be examined as Megabug maintains its own internal screen.
USER GROUP, £13.00p, tape, Machine code, VDU-2K only, needs Zymon.

RACKOVSKY
Chess program to allow you to play chess from levels 1 to 6 against the computer. The program provides for a full on screen grapics display of the chess board, a list of moves, the computers opinion of the current game leader and a deadmen men display. The graphics are provided by plugging a ROM into the VDU card second ROM socket. Castleing and en-passant are both fully supported and the king falls over when mated. 64 character screens only. American move notation.
USER GROUP, £5.00p, Machine code, tape and Rom, Needs Zymon.

REVAS
Dis-assembler or reverse-assembler which is an implimentation of a program called REVAS written by David Parkinson adjusted to operate on the Interak computer. It is an interactive program capable of producing source programs in several forms. The dis-assembler also recognises three special instructions which are used in Nascom software. The program is supplied on tape and occupies memory from C000H to CDBEH. Versions assembled to different addresses can be supplied. Dynamic lable allocation is a special feature of the dis-assembler. A full manual is provided with the package.
USER GROUP, £price on application, Machine code, Needs Zymon.

XTAL BASIC
16k interpreter basic for the Interak computer. User defined reserved words facility. Full screen editor. Program chaining. Named tape files. Five letter variables allowed. Integer and floating numbers. String variables and arrays. Bit manipulation. Line editor. Direct port access. Print output formating commands. Machine code linkage. Chunky graphics commands. Provided on tape with the possibility of an upgrade to disk working in the future. Proffesionally produced manual included. Versions for both screen formats. Supplied by the user group under licence from Crystal Research ltd.
USER GROUP, £40.00p, Machine code, Needs Zymon.

ZYBASIC
6k floating point basic, Programs may be stored on tape. Two versions exist, one is tape loaded at 2400 Baud (30secs) and runs at A000H, the other is in ROM and runs at C000H. Floating point arithmetic from +-1.5 x 10^-39 to +-1.7 x10^+38, hexidecimal input, Pixel graphics Set, Reset and Point operate with VDU chunky graphics, 260 Numeric variables, 26 String variables up to 255 characters, built in printer driver. Versions for both VDU screen formats A or C.
GREENBANK, £15.95 tape, £27.75 Rom, Machine code, Needs Zymon. + VAT, p&p

CONTACTS

BACK ISSUES... D.Parkins, Greenbank Electronics, 92 New Chester road,
New Ferry, Wirral, Merseyside, L62 5AG.

BOOKS......... R.E.Bowyer, 45 Ford drive, Yarnfield, Stone, Staffs.

BULLETIN BOARD Software and services to the Interak computer.
M & M Electronics, 8 Ayre View, Bride, Isle of man.

DATA SHEET DATA BASE .. Swop, borrow, lend, chip data sheets
7 Drumcliff road,Thurnby Lodge,Leicester,LE5 2LH.

EDITOR........ R.Eldridge, 28 Wycherley Close, Blackheath,London,SE3 7QH.

GREENBANK .... Greenbank Electronics Ltd, 92 New Chester road,
New Ferry, Wirral, Merseyside, L62 5AG.

M.SAUNDERS ... M.Saunders, 7 Drumcliff road,Thurnby Lodge,Leicester,LE5 2LH.

M&M ELECTRONICS, 8 Ayre View, Bride, Isle of man.

MEMBERSHIP.... P.P.Vella, 19 Ford drive, Yarnfield, Staffs.

POINT CONTACT TAPES..Contact and communicate with other members by cassette tape. Point Contact tapes,7 Drumcliff Rd, Thurnby Lodge,
Leicester, LE5 2LH.

SUBSCRIPTIONS. P.P.Vella, 19 Ford drive, Yarnfield, Staffs.

USER GROUP ... P.P.Vella, 19 Ford Drive, Yarnfield, Staffs.

FOR SALE

3 MXD2 16k Dynamic Ram cards £11.00p each. D.L.G.Mason, 8 Ayre view, Bride, Isle of man.